# CALFED DRINKING WATER QUALITY PROGRAM
# FY 2000 IMPLEMENTATION

## I. Program Background

CALFED's drinking water quality goal is to continuously improve source water quality that allows for municipal water suppliers to deliver safe, reliable, and affordable drinking water that meets, and where feasible, is better than the applicable drinking water standards. Through extensive stakeholder input during Phase I and II, CALFED identified concerns that result from using Delta waters as a source of drinking water supply and identified near term actions that could be taken to improve source water quality. Bromide, organic carbon, pathogens, salts, nutrients and turbidity are constituents of major concern for drinking water. The concentrations and loadings of these constituents will be affected by actions from the Drinking Water Quality Program and also from the choice of storage and conveyance and water management options.

## II. FY 2000 Funding Priorities

Staff recommendation is to allocate $2.0 million among four drinking water quality actions:

1. Assessment of Sources and Magnitudes of Loads of Drinking Water Constituents of Concern
2. Veale/Byron Tract Drainage Discharge Management
3. Bay Area Regional Blending Assessment
4. Salt Removal System - Pilot Project

This allocation is consistent with the CALFED FY 2000 Preliminary Federal Funding Allocation priorities for non-ecosystem actions and consistent with the Stage 1A and Stage 1 priorities as described in the June 1999 revised Programmatic EIR/S.

## III. Stakeholder and Public Input

The Delta Drinking Water Council was formed to advise BDAC on actions necessary to assure the continuous improvement of drinking water quality through CALFED. In addition, three agency/stakeholder groups are providing technical input for the CALFED Drinking Water Quality Program early implementation actions and the CALFED Integrated Storage Investigation:

1. Drinking Water Constituents Work Group
2. Veale/Byron Tract Work Group
3. Drinking Water Quality Operations Work Group

Selection criteria for projects were developed by the Water Quality Technical Group during Phase II and later refined by several Work Groups. These selection criteria were used by the CALFED staff to select early implementation actions for funding in FY2000:

- Seriousness of the health risk and other problems to be addressed by the proposed action
- Degree to which the problem and solutions are understood. This recognizes that studies may be needed to investigate and identify problems and solutions.
- Likelihood of the proposed solution reducing impairment of beneficial uses
- Availability of a willing and competent lead implementing entity
- Timeframe in which the benefits of the action can be realized and measured
- Benefits and costs of the action in relation to other proposed actions
- Funds and ability to leverage CALFED funds by partnerships with other entities and funding sources, including existing sources of CALFED agency funds
- Level of environmental documentation and permits required
- Compliance with CALFED solution principles
- Compliance with Delta Protection Act, CVPIA and other laws and statutes governing water quality and supply in the Delta
- Amount of local involvement
- Compatibility with other CALFED Program elements

## IV. Proposed Method for Distributing Funding

Proposed methods for distribution of funding are described for each of the four drinking water quality actions:

1. **Assessment of Sources and Magnitudes of Loads of Drinking Water Constituents of Concern** - Two proposals are being developed for funding. Project proposals are being prepared with input from the Constituents Work Group. The first proposal, which would be a **directed action**, is to evaluate existing data to determine baseline conditions under various hydrologic conditions and operational scenario. The information from this action will be used to determine the adequacy of current information and to identify monitoring and research gaps. **Project management would occur within the CALFED Drinking Water Quality Program** through a USBR consultant. Key agency support would be through the U.S. Geological Survey and the California Department of Water Resources. This would be a one-year project and would be funded at approximately **$150,000.**

   The second proposal in this category is for implementation of a monitoring and research program so that changes in Delta water quality resulting from CALFED actions and the effectiveness of water quality actions can be evaluated. **This project would be managed by the U. S. Geological Survey**, with key agency support provided by the California Department of Water Resources and the U. S. Environmental Protection Agency. The proposed method for distribution of funds would be through a combination of **directed action and open solicitation (RFP).** This would be a multi-year project and would be funded at approximately **$550,000** the first year.

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2. **Veale/Byron Tract Drainage Discharge Management** - This action focuses on a group of measures designed to improve both the quantity and quality of drainage discharges from Veale and Byron Tracts and to improve the drinking water sources at south Delta drinking water intakes. The measures may include: drain relocations, outfall

improvements, discharge timing management, drainage treatment and storm flow management. Several solution approaches are emerging from Work Group meetings. Modifying the existing Byron Tract outfall could be a cost-effective measure to reduce adverse impacts on water quality at CCWD's Los Vaqueros intake. A comprehensive investigation of drainage sources influencing CCWD's Rock Slough intake has been recommended, as no single action has emerged as clearly superior for Veale Tract. Use of wetlands for treating drainage from Veale and Byron Tracts has also been recommended.

A project proposal is being prepared with technical input from CALFED's Veale/Byron Tract Work Group. **Project management responsibility has not been determined.** The proposed method for distribution of funds would be through a combination of **directed action and open solicitation (RFP).** This would be a multi-year project and would be funded at approximately **$500,000** the first year.

3. **Bay Area Regional Blending Assessment** - As part of its Drinking Water Quality Improvement Strategy, CALFED will consider opportunities to engage in water exchanges to meet drinking water quality needs. On November 16, staff met with representatives from Bay Area urban water suppliers to develop a proposal for investigating the potential for regional water exchanges to improve source water quality. The initial phase of work would focus on two technical tasks: (1) quantitatively assess individual agency needs for higher quality source water; and (2) assess the ability of existing facilities to convey the needed quantities assuming the water is available. An additional phase identifying specific sources of higher quality supply would be undertaken if warranted by the results of the initial phase.

**Project management would occur within the CALFED Drinking Water Quality Program** through a USBR consultant with policy and technical input provided through stakeholder committees. A project proposal is being prepared. The proposed method for distributing funding is by **directed action**. This would be a single-year project and would be funded at approximately **$100,000**. In-kind services would be provided by the following Bay Area urban water suppliers: Alameda County Water District; Contra Costa Water District; East Bay Municipal Utility District; Santa Clara Valley Water District; San Francisco Public Utilities Commission; Bay Areas Water Users Association.

4. **Salt Removal System-Pilot Project** -Salt removal of irrigation runoff in the San Joaquin Valley would reduce salt discharges to the San Joaquin River and would prevent salt buildup on agricultural land. This type of action would protect aquatic resources and maintain valuable agricultural resources. Pilot projects are being sought that remove salt and propose a disposal or reuse system. The proposed method for funding this type of project would be developed in coordination with the Salinity/Selenium Work Group, and could result in either a directed action or open solicitation. This would be a multi year project that would be funded at approximately $700,000 the first year.

## V. Time Line

Draft proposals are expected to be reviewed by the Work Groups in time for the next Delta Drinking Water Council meeting on December 16, 1999. After the DDWC reviews and makes recommendations on the proposals, the proposals will be sent through BDAC to the Policy Group for approval for funding. The request for approval for funding by the Policy Group will occur at the January 2000 meeting.

# EXECUTIVE SUMMARY
# ASSESSMENT OF SOURCES AND MAGNITUDES OF LOADS OF DRINKING WATER CONSTITUENTS OF CONCERN

## Project Purpose

The objective of this project is to determine baseline water quality conditions under various hydrologic conditions and operational scenarios so that changes in Delta water quality resulting from CALFED actions and the effectiveness of water quality actions can be evaluated. In addition, this investigation will be used to determine the adequacy of current information, to identify monitoring and research gaps, and to help prioritize future actions to reduce loads of drinking water constituents of concern.

## Project Description

This investigation will consist of compiling and analyzing existing water quality data from key locations in the Delta and tributaries and within the State Water Project system. Data from a number of agencies and programs will be obtained to provide a comprehensive analysis of Delta water quality data. The analysis of data will consist of statistical analyses and modeling to determine existing or baseline conditions under various hydrologic and operational scenarios. A key aspect of this project will be involving stakeholders in the review so that all stakeholders can reach agreement on the definition of existing conditions. This is needed so that the effectiveness of CALFED actions can be determined based upon an agreed upon baseline.

## Implementing Agencies

This project will be a collaborative effort of state and federal agencies and stakeholders participating in the Drinking Water Constituents Work Group. The project will be lead by CALFED Drinking Water Quality Program staff. Key collaborating agencies include the Department of Water Resources, the Central Valley Regional Board, the U.S. Geological Survey, the Department of Health Services Office of Drinking Water, and water agencies diverting or exporting water from the Delta.

## Task Descriptions

A detailed work plan was developed by the Drinking Water Constituents Work Group and will be included with the proposal.

## Schedule and Costs

We are requesting approximately $150,000 in CALFED funds to cover the cost of a consultant project manager who will work full time for six months under the direction of CALFED Drinking Water Program staff. The anticipated completion date of the project is June 2000.

## Project Management

The Project Manager will be a CALFED consultant who will work under the supervision of the Drinking Water Quality Program Manager.

# EXECUTIVE SUMMARY
# DRINKING WATER MONITORING PROPOSAL

## Background

During Phase II, the Water Quality Program met with the Water Quality Technical Group, composed of agencies and stakeholders, to identify actions which would determine the quantity and quality of drinking water constituents of concern and actions to improve drinking water sources. The action upon which this proposal is based is entitled "Assessment of Sources and Magnitudes of Loads of Drinking Water Constituents of Concern" and is listed in the Water Quality Program Implementation Strategy of the Programmatic EIR/S, June 1999. Since August 1999, the Drinking Water Constituents Work Group, a component of the WQTG, has been working on refining this action. Two proposals to implement this action are in the process of being developed. The first proposal, which is separate but linked to this proposal, consists of compiling and analyzing existing water quality data (both statistical and modeling) to help determine baseline conditions from which to measure changes in Delta water as a result of CALFED actions. This proposal uses the evaluation from the first proposal, and consists of a series of tasks to track changes (both quality and quantity) in drinking water over a period of time given natural hydrologic conditions and water management operations in the Delta.

This monitoring proposal addresses the constituents of concern to drinking water which are bromide, pathogenic organisms, total dissolved solids, and total organic carbon (as a precursor to the formation of disinfection by-products). A number of other environmental variables are also likely to affect the concentration of carbon compounds in Delta waters including temperature, algae/chlorophyll, salinity, turbidity and macrophyte biomass which are closely linked to the quantity and quality of carbon compounds in Delta waters.

## Project Purpose

The purpose of this project is to:

1. Monitor key Delta channels where no baseline or hydrologic data exists to fill critical gaps,
2. Monitor for changes in baseline water quality conditions,
3. Develop forecasting ability and link Delta-wide model to site-specific changes,
4. Quantify the loading and quality of drinking water constituents including precursors such as carbon,
5. Prioritize management options,
6. Refine the understanding of key sources, and,
7. Design and implement cost-effective actions for source control.

## Project Description

The Drinking Water Constituents Work Group recommends taking three different approaches for: a) salinity, TDS, and bromide; b) carbon compounds (precursors); and, c) pathogens. The tasks are being refined in a Work Plan, prepared through the input of the Drinking Water

Constituents Work Group. The tasks will be structured to first implement a monitoring network that will track water quality changes over time, followed by tasks that will refine the understnading of how different sources can affect changes in water quality. At the end of the first implementation stage, there will be a robust set of information that will enable an analysis of how much Delta water quality has changed and why.

**Implementing Agencies**

It is proposed that the lead agencies will be the federal U.S. Geological Survey and the state Department of Water Resources. The project will be overseen by the CALFED Drinking Water Quality Program Manager. Key collaborating agencies include the Central Valley Regional Water Quality Control Board, the Department of Health Services, and water agencies using water from the Delta.

**Task Descriptions**

The work plan, through input of the Drinking Water Constituents Work Group, will contain detailed task descriptions and be attached to the proposal.

**Schedule and Costs**

The schedule for this proposal begins in Spring 2000 and ends Spring 2002. The next phase of this proposal, which will consist of maintenance of a monitoring program to track water quality changes, will end December 2007, the end of Stage 1, a critical milestone for the CALFED Program. This would be a multi-year project and would be funded at approximately $550,000 the first year.

**Project Management**

It is recommended that Project Management be conducted by USGS with oversight of CALFED Drinking Water Quality Program. The Drinking Water Constituents Work Group will continue to exist to provide technical guidance and review of products.

## Executive Summary
## Old River and Rock Slough Water Quality Actions

### Project Purposes

The primary purpose of this project is to minimize elevated salinity and other constituents of concern to drinking water at urban intakes in the south Delta. Practical methods of reducing the impacts from the major sources will be developed and implemented where possible. Secondary project purposes include concurrent regional environmental water quality improvements, wetland creation, and flood control benefits if compatible with the primary project purpose. The project will serve as a pilot or demonstration project for other source water improvement actions by CALFED in the Bay-Delta system. It is included in the proposed Lower San Joaquin River and South Delta Bundle, a group of actions designed to provide balanced, incremental improvements in water quality, habitat quality, flood control, and water supply reliability in the region.

### Project Description

The project has three components. The first two components are early implementation actions that could proceed before a Notice of Determination/Record of Decision of the CALFED Programmatic Environmental Impact Report/Environmental Impact Statement. The results from these two components would confirm the sources leading to localized pollutant increases at CCWD's intakes, identify the best actions to minimize these increases, prepare environmental documentation and meet other permit requirements, and implement the selected actions. The third component is a long-term action to achieve reductions in salt and other pollutant loads in the Delta water.

The first component aims to reduce the drainage from Byron Tract (Reclamation District 800) that would be diverted at CCWD's intake at Old River south of Borden Highway (State Route 4). The second component aims to reduce the drainage from Veale Tract (and possibly the Knightsen area) that enters Rock Slough through surface drainage or seepage and is then diverted into the Contra Costa Canal. The third component aims to reduce the pollutant loads discharged into the Old River and nearby channels between Clifton Court and Franks Tract through wetlands. The project will also study the feasibility of integrating flood management in the Knightsen area to water quality improvements.

### Implementing and Cooperating Agencies

The agencies that would be actively involved, either in the project development, as co-leads in the CEQA/NEPA process, and/or implementation include the Contra Costa Water District, the Department of Water Resources, the Contra Costa County, the United States Bureau of Reclamation, and the U.S. Army Corps of Engineers. Relocation and modification of drainage pump facilities would require levee and channel engineering and floodplain management expertise. The Corps of Engineers could serve as cooperating agency for NEPA compliance and implementation of the project.

## Task Description

A detailed description of the tasks is included in the attached Proposal.

## Project Schedule and Costs

| Task | Schedule Start | Compete | Total funding in $1,000s |
|---|---|---|---|
| *Component 1. Old River Watershed at the Los Vaqueros intake* | 01/2000 | 06/2001 | 600 |
| *Component 2. Rock Slough Watershed* | 01/2000 | 12/2003 | 3,000 – 9,200 |
| *Component 3. Drainage reduction along Old River between Clifton Court and Franks Tract* | 06/2000 | 12/2003 | 400 |
| TOTAL BUDGET | | | 4,000 – 10,200 |

## Project Management

The project will be managed locally by the Contra Costa Water District, the Contra Costa County, or landowners as appropriate and corresponding to the specific action. The Veale Tract & Byron Tract Work Group, consisting of CALFED agency staff, local property owners, urban agencies staff, and others interested in the watershed will oversee and provide input throughout project implementation. Coordination with other CALFED agencies and projects will be through the CALFED Drinking Water Quality Program.

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# Draft Project Workplan
# Old River and Rock Slough Water Quality Actions

## Project Purposes

The primary purpose of this project is to quantify the sources of elevated salinity and other constituents of concern to drinking water at urban intakes in the south Delta. Once identified, practical methods of reducing the impacts from the major sources will be developed and implemented where possible. Secondary project purposes include concurrent regional environmental water quality improvements, wetland creation, and flood control benefits if compatible with the primary project purpose. The project will serve as a pilot or demonstration project for other source water improvement actions by CALFED in the Bay-Delta system. It is included in the proposed Lower San Joaquin River and South Delta Bundle, a group of actions designed to provide balanced, incremental improvements in water quality, habitat quality, flood control, and water supply reliability in the region.

The water quality benefits of this project, when combined with other ongoing and proposed CALFED activities, are intended to result in a net water quality improvement and assist in meeting existing goals and standards for municipal, industrial and agricultural uses. In particular, the project component related to Rock Slough will significantly benefit the State Water Project and Central Valley Project by reducing the impacts of island drainage on the effectiveness of project operations to meet municipal and industrial standards in the Water Quality Control Plan. The water quality benefits of this project may also serve to offset some water quality impacts associated with increased SWP exports and barrier operations that may occur under certain hydrologic conditions.

The project has three components. The first two components are early implementation actions that would reduce the salinity and other pollutant concentrations at specific south Delta intakes. The second component also includes an analysis of the flood management alternatives in Knightsen and their water quality impacts at urban intakes. Implementation of any of the flood management components would increase project cost significantly. Funding for flood control measures will be pursued through a variety of sources. The third component addresses a long-term solution to reduce pollutants, including pesticides and nutrients, discharged into Delta channels and will be pursued in collaboration with the Drinking Water Constituents Work Group.

**Project Description**

This project is the first phase in a comprehensive CALFED Drinking Water Quality Improvement Strategy designed to meet the CALFED objective to continuously improve source water quality. The Improvement Strategy aims to allow municipal water suppliers to deliver safe, reliable, and affordable drinking water that meets, and where feasible, is better than applicable drinking water standards.

Drainage discharges contain salt, organic carbon, and other constituents of concern to municipal and industrial users of Delta water, and could be major sources of these constituents at Delta drinking water intakes. The Drinking Water Constituents Work Group, a component of the CALFED Drinking Water Quality Program, is working towards obtaining accurate estimates of the discharges into the San Joaquin and Sacramento River and the Delta, and quantifying their impacts at urban intakes.

A number of drainage discharges are in the immediate vicinity of urban intakes in the Delta. For example, drainage along Barker and Lindsey Slough leads to exceptionally high turbidity and organic carbon at the North Bay Aqueduct intake. Other drainage discharges directly into the Clifton Court Forebay, the intake channel (Rock Slough) of the Contra Costa Canal, and into Old River in the proximity of Contra Costa Water District's new intake at Old River. These discharges, with high concentrations of constituents of concern to drinking water, at times enter the drinking water supply intakes with little dilution and may lead to significant increases in the salinity and other pollutant concentrations.

Early implementation actions in the CALFED Drinking Water Quality Program target drainage discharges and wet weather runoffs closest to M&I intakes in the Delta. For example, the Old River and Rock Slough Water Quality Actions aim to reduce the amount of drainage discharges that would enter Contra Costa Water District's (CCWD) drinking water intakes at Rock Slough and Old River. A separate project, the North Bay Aqueduct Watershed Program, aims to reduce the runoffs from dairy farms into Barker and Lindsey Slough.

These pilot projects discussed above will help to develop a framework to reduce drainage impacts and improve the quality of municipal water supplies by reducing the salt (including bromide), organic carbon, and other pollutant loads (such as pesticides and pathogens) commonly found in drainage discharges. Later phases of the CALFED Drinking Water Quality Program will propose a more comprehensive solution to reduce pollutant loads in Delta water.

**Pilot project to reduce the impacts of drainage discharges on Delta drinking water supply**

The flow and transport characteristics in the Delta channels at two of CCWD's drinking water intakes are such that relatively large percentages of drainage discharges and wet weather runoffs in the vicinity of the intakes could be diverted into CCWD's drinking water supply. Under certain hydrological conditions, the small number of drainage discharges in the vicinity of these intakes could lead to a significant increase in the salinity in CCWD's drinking water supply. However, the dispersion characteristics of these drainage discharges are such that relatively

minor modifications in the discharge facility could greatly reduce the water quality impacts at CCWD's intakes. This project aims to identify the best alternatives and implement these modifications.

The project has three components. The first two components are early implementation actions that could proceed before a Notice of Determination/Record of Decision of the CALFED Programmatic Environmental Impact Report/Environmental Impact Statement. The results from these two components would confirm the sources leading to localized pollutant increases at CCWD's intakes, identify the best actions to minimize these increases, prepare environmental documentation and meet other permit requirements, and implement the selected actions. The third component is a long-term action to achieve reductions in salt and other pollutant loads in the Delta water.

The first component aims to reduce the drainage from Byron Tract (Reclamation District 800) that would be diverted at CCWD's intake at Old River south of Borden Highway (State Route 4). Potential project alternatives are modification of the existing outfall and the drainage system. Modifications in drainage discharge operation would stop the discharge (by holding drainage water in storage) when the drainage would have flowed past CCWD's intake, then release it when the river flow is away from CCWD's intake.

The second component aims to reduce the drainage from Veale Tract (and possibly the Knightsen area) that enters Rock Slough through surface drainage or seepage and is then diverted into the Contra Costa Canal. Relocation of the discharge pump facilities away from Rock Slough, possibly in conjunction with drainage and flood management measures in the Knightsen area, offers the most promising approach to improve water quality in Rock Slough. Reducing the impacts of drainage in Rock Slough will improve the effectiveness of the SWP and CVP in meeting water quality standards at that location, while at the same time offering water quality improvements to CCWD and other diverters in the area.

The third component aims to reduce the pollutant loads discharged into the Old River and nearby channels between Clifton Court and Franks Tract. One possibility is to design and create wetlands to reduce the pesticide, nutrients, organic carbon, and other pollutant loads commonly found in drainage discharges. Another approach is to connect drainage ditches between neighboring islands through siphons underneath the channels such that all drainage from the targeted islands would discharge into a point further downstream to reduce their effects on the water quality in the interior Delta. This component will be coordinated with the CALFED Drinking Water Constituents Work Group and the Ecosystem Restoration and Habitat Management Work Group.

Further details on the flow and transport in the channels at CCWD's intakes, historical salinity measurements documenting the water quality degradation, and different approaches to improving the water quality at the intakes are discussed in the Attachments to this proposal.

This project has multiple benefits:

- Removing the variability in salinity due to drainage discharges would improve the ability of SWP and CVP to comply with the water quality standard at Rock Slough. This would improve certainty in the effects of the projects' operations and lead to water supply benefits.
- It would lead to immediate water quality improvements to the drinking water supplies of urban agencies diverting water from south Delta.
- Improved water quality in Delta channels from a reduction of pollutants such as pesticides will also benefit fishery and the ecosystem health in general.
- Improved Delta water quality near CCWD's intakes will enhance the ability of CCWD's Los Vaqueros Project to provide fisheries benefits, e.g., by ceasing all Delta diversions for 30 days in the spring. Better source water quality at CCWD's intakes reduces the demand for blending water from the Los Vaqueros Reservoir and increases CCWD's ability to refill the reservoir. The reservoir would be above emergency storage level more often and allow CCWD to cease all diversions from the Delta during fish sensitive periods.

In response to a number of stakeholders' interests, the project is broadened to include flood management in the Knightsen area. Tasks 1e and 1f in Component 2 (see below) would review flood control options and their water quality impacts at CCWD's Rock Slough intake. Implementation of the flood control measures is included in the budget estimate. However, these measures will be funded through a variety of different funding sources such as from the state and federal flood management programs and local agencies.

**Implementing and Cooperating Agencies**

*Contra Costa Water District* The proposed project would improve source water quality and water supply reliability for CCWD as described in the preceding paragraphs. CCWD would be a likely candidate for lead agency for CEQA compliance. CCWD might also provide project management for this project.

*Department of Water Resources* The proposed actions would benefit the State Water Project and the Central Valley Project. The benefits include improved ability to comply with the Rock Slough standard in the Water Quality Control Plan at reduced water supply costs, potential improvements in water quality in the Clifton Court Forebay, and implementation of the South Delta Improvement Program. DWR would likely serve as a cooperating or co-lead agency for CEQA compliance.

*Contra Costa County* The County has jurisdiction over most of the farmland in the project area and is responsible for regional flood management. The County could serve as a co-lead agency for CEQA compliance and implementation of the project. The County's involvement will be particularly important if the project is configured to improve flood control and drainage for the Knightsen area.

*United States Bureau of Reclamation* The proposed actions would benefit the Central Valley Project. These benefits include improved ability to comply with the Rock Slough standard in the

Water Quality Control Plan, and implementation of the South Delta Improvement Program. USBR would be a likely candidate for lead federal agency for NEPA compliance.

*U.S. Army Corps of Engineers* Relocation and modification of drainage pump facilities would require levee and channel engineering and floodplain management expertise. The Corps of Engineers could serve as cooperating agency for NEPA compliance and implementation of the project.

**Project Schedule and Costs**

| | Task | Schedule Start | Schedule Compete | Total funding in $1,000s |
|---|---|---|---|---|
| *Component 1. Old River Watershed at the Los Vaqueros intake* | | | | |
| 1 | Confirm sources of WQ degradation | 01/2000 | 02/2000 | 20 |
| 2 | Determine preferred actions | 02/2000 | 03/2000 | 20 |
| 3 | Plan implementation | 03/2000 | 09/2000 | 60 |
| 4 | Implementation/Construction | 09/2000 | 06/2001 | 500 |
| | | | Subtotal | 600 |
| *Component 2. Rock Slough Watershed* | | | | |
| 1 | Quantify sources of degradation | | | |
| *a* | Identify sources of degradation | 01/2000 | 04/2000 | 30 |
| *b* | Quantify discharges and seepage | 04/2000 | 09/2000 | 150 |
| *c* | Sample discharges and seepage | 04/2000 | 09/2000 | 100 |
| *d* | Quantify degradation at intake | 09/2000 | 12/2000 | 20 |
| *e* | Review Knightsen flood control plans | 01/2000 | 12/2000 | 50 |
| *f* | Review wetland creation | 01/2000 | 12/2000 | 50 |
| 2 | Evaluate alternatives | 01/2001 | 12/2001 | 100 – 300 |
| 3 | Plan implementation | 09/2001 | 12/2002 | 500 |
| 4 | Implementation/Construction | 01/2003 | 12/2003 | 2,000 - 8,000 |
| | | | Subtotal | 3,000 – 9,200 |
| *Component 3. Drainage reduction along Old River between Clifton Court and Franks Tract* | | | | |
| 1 | Quantify discharges | 06/2000 | 12/2002 | 200 |
| 2 | Evaluate alternatives | 01/2002 | 12/2003 | 200 |
| | | | Subtotal | 400 |
| | | | TOTAL BUDGET | 4,000 – 10,200 |

**Project Task Description**

The project has three components. The first two components are early implementation actions. The third component is the first phase of a long-term action. Considerable historical salinity data and analytical studies have been collected and performed. This project will build on this existing information.

Component 1. Old River Watershed at the Los Vaqueros intake

*Task 1. Confirm water quality impacts of the Reclamation District 800 discharge:* Substantial historical data and studies (both field and analytical) are available. This task would review existing information and identify and address any uncertainties.

*Task 2. Identify the preferred alternative for reducing the water quality impacts* A number of approaches have been reviewed in a series of meetings of the Veale Tract & Byron Tract Work Group. Modifying the existing discharge outfall has emerged as the most promising short-term solution to improving the water quality at the Old River intake. A study documenting this water quality improvement will be completed by March 2000. This task would review the analyses completed so far and confirm the findings or identify and address remaining uncertainties, if any. Different approaches might also be considered. For example, the work group considered the creation of wetlands on Byron Tract, which could potentially serve the dual purposes of biological reduction in some pollutant concentrations and drainage water storage. With sufficient storage capacity on Byron Tract, it would be possible to sequence discharges of drainage water to coincide with the incoming tide, thus assuring that the discharge plume is not drawn into the CCWD intake. In evaluating the alternatives, those that could complement or be implemented in conjunction with an ongoing Reclamation District 800 project to address a siltation problem in the Discovery Bay channels should be considered with a higher priority.

*Task 3. Plan implementation* This task would identify and outreach all stakeholders affected by the selected action alternative and assure that redirected impacts (if any) are adequately addressed and resolved. It would also secure all permits and meet CEQA/NEPA requirements. Considerable stakeholders outreach has been achieved during a series of Veale Tract & Byron Tract Work Group meetings.

*Task 4. Implementation* Construct and initiate operation of the selected water quality improvement action.

Component 2. Rock Slough Watershed

*Task 1. Quantify the sources of water quality degradation along Rock Slough and the Contra Costa Canal* A number of previous studies, including field measurements and analytical studies, have yielded qualitative information on the sources of degradation along Rock Slough and the Contra Costa Canal. This task would build on these existing information and include a number of subtasks:

*1a.* Identify sources of water degradation through simultaneous and frequent (hourly, say) measurements along closely spaced stations between CCWD's Pumping Plant No. 1 and the junction with Old River.

*1b.* Quantify the volume of surface discharge and subsurface flow (seepage) from Veale Tract, Knightsen, and Hotchkiss Tract into Rock Slough and the Contra Costa Canal in the winter and spring.

*1c.* Sample quality of drainage and seepage into Rock Slough and the Contra Costa Canal during wet weather runoff, flood event, and during the irrigation season.

*1d.* Estimate long term water quality impacts at CCWD's canal intake over the long term, based on seasonal variations in drainage discharge, groundwater seepage, and wet weather runoff along Rock Slough and vicinity channels.

*1e.* Review the flood management plans developed previously for the Knightsen area. Investigate and estimate the impacts on the water quality at CCWD's Canal intake if one or more components of these flood management plans are implemented.

*If.* Explore the creation and operation of wetlands and/or holding ponds as bio-filters to manage the drainage and wet weather runoffs from Knightsen, Veale Tract, and Hotchkiss Tract, in particular their effects on the water quality of the discharge. Review existing studies on the different types of wetlands and their effects in removing water quality constituents such as pesticides, nutrients, organic carbon, and metals.

*Task 2. Quantify water quality improvement alternatives and identify redirected impacts, if any* Analyze the feasibility of various options for water quality improvement at CCWD's canal intake, including the possibilities of incorporating components of Knightsen flood management plans. Screen each alternative for environmental, financial, and other impacts. The alternatives are discussed in Attachment D to this proposal. Identify sources of funding for each alternative.

*Task 3. Identify preferred alternative and plan implementation process* Identify and outreach to all stakeholders affected by the selected alternative and assure that redirected impacts (if any) are adequately addressed and resolved. It would also secure all permits and meet CEQA/NEPA requirements. Considerable stakeholders outreach has been achieved during a series of meetings of the Veale Tract & Byron Tract Work Group.

*Task 4. Implementation* Construct and initiate operation of the selected water quality improvement action.

Component 3. Drainage reduction along Old River

This component of the project aims to reduce the loads of salt, pesticides, nutrients, metals, and other pollutants commonly associated with drainage and treated wastewater discharges into the Delta, and in particular to reduce their impacts at all drinking water intakes in the south Delta. For better efficiency, the scope of this component would extend beyond Veale Tract and Byron Tract to include most of the south-western Delta. Coordination with the Drinking Water Constituents Workgroup and the Drinking Water Quality Operations Group would be essential. Only the study phase is planned in this project and actual implementation will be deferred to late Stage 1.

*Task 1. Quantify source loads along the Old River* Compile and integrate results from Components 1 and 2 of this proposal and identify missing information required to quantify pollutant loads in the region, include potential increases in pollutant loads due to population growth and other activities. Pollutant loads evaluated are to include all constituents of concern to drinking water, including but not limited to salt (TDS, chloride, bromide, sodium), organic carbon, pathogens (*Cryptosporidium parvum* and *Giardia lablia* in particular), metals, and pesticides. Compare these estimates to other source loads into the Delta, in particular from the San Joaquin and Sacramento River inflows and seawater intrusion.

*Task 2. Identify and evaluate source reduction options* Investigate the use of wetlands to remove constituents of concern in drainage and treated municipal wastewater discharges. Investigate modification of existing and installation of new drainage conveyance facilities to relocate the point of discharges.

**Project Management**

The project will be managed locally by the Contra Costa Water District, the Contra Costa County, or landowners as appropriate and corresponding to the specific action. The Veale Tract & Byron Tract Work Group, consisting of CALFED agency staff, local property owners, urban agencies staff, and others interested in the watershed will oversee and provide input throughout project implementation. Coordination with other CALFED agencies and projects will be through the CALFED Drinking Water Quality Program.

## Attachment A
## Water Quality Degradation in Old River

High salinity at Delta intakes is due to seawater intrusion, drainage, wet weather runoffs, and/or treated wastewater discharges. Seawater intrusion can be reduced only by costly measures such as increasing Delta outflow or major changes in Delta channels. Salinity impacts due to drainage, on the other hand, could be mitigated to a significant extent by pretreatment or by relocating those discharges that have the greatest impacts at the intakes.

Salinity increases due to drainage can be distinguished from those due to seawater intrusion by the different relationships between the electrical conductivity (EC) and chloride (or the concentration of other dissolved solids). Drainage impacts at an interior Delta station (such as Rock Slough) can also be identified when the salinity at the interior station is higher than that at more seaward stations (e.g. at Jersey Point).

The major sources of drainage reaching CCWD's intakes are Delta islands and in the watershed of the San Joaquin River. The salinity and volume of individual drainage vary considerably, both seasonally and geographically. Typically, discharges from Delta islands have the highest salinity when the fields are leached in winter months. Salinity in the San Joaquin River decreases as flow increases.

Most of the drainage discharges are well mixed in the channel water by the time they reach CCWD's intakes. However, discharges in the immediate vicinity of CCWD's Rock Slough intake can have larger impacts on the quality of CCWD's water supply. Management of these sources would lead to improvement in the water quality of CCWD's supply.

Drainage Impact

Contra Costa Water District has installed and operated continuous electrical conductivity (EC) measurements at the Los Vaqueros intake since May 1998. Sporadic spikes with amplitudes between 0.05 and 0.15 mS/cm (between 10 and 40 mg/L chloride) and lasting between 2 to 8 hours have been recorded (Figure A-1) when the tidally-averaged EC ranged between 0.22 and 0.28 mS/cm (60 and 70 mg/L chloride). This attachment discusses some of the characteristics of these sporadic spikes in EC measured at the LV intake. In particular, these analyses show that the sporadic EC increases:

- were not due to sea water intrusion, variation in salinity in the San Joaquin inflow, or drainage discharged far from the intake
- always started during ebb tide (when flow in the Old River was to the north)
- could be caused by discharges into the Old River south of the Los Vaqueros intake

Effects of sea water intrusion and salt load in the San Joaquin River inflow

The EC measurement at LV was compared with hourly data (from CDEC) taken at Old River at Bacon Island and Middle River at Victoria Canal (Figure A-2). The EC variations at both of these nearby stations were much smaller in amplitude than the sporadic spikes found at LV.

The EC in Old River further north was consistently below the peak values of the EC anomalies at LV. The EC anomalies are therefore not likely to be due to seawater intrusion.[1] Similarly, the EC in Middle River at Victoria Canal was much lower than the spikes in LV EC. The anomalies were unlikely to be caused by varying salinity in the San Joaquin River inflow[2] or drainage into south Delta away from the LV intake (e.g. into Middle River).

Likelihood of local drainage causing the EC anomalies

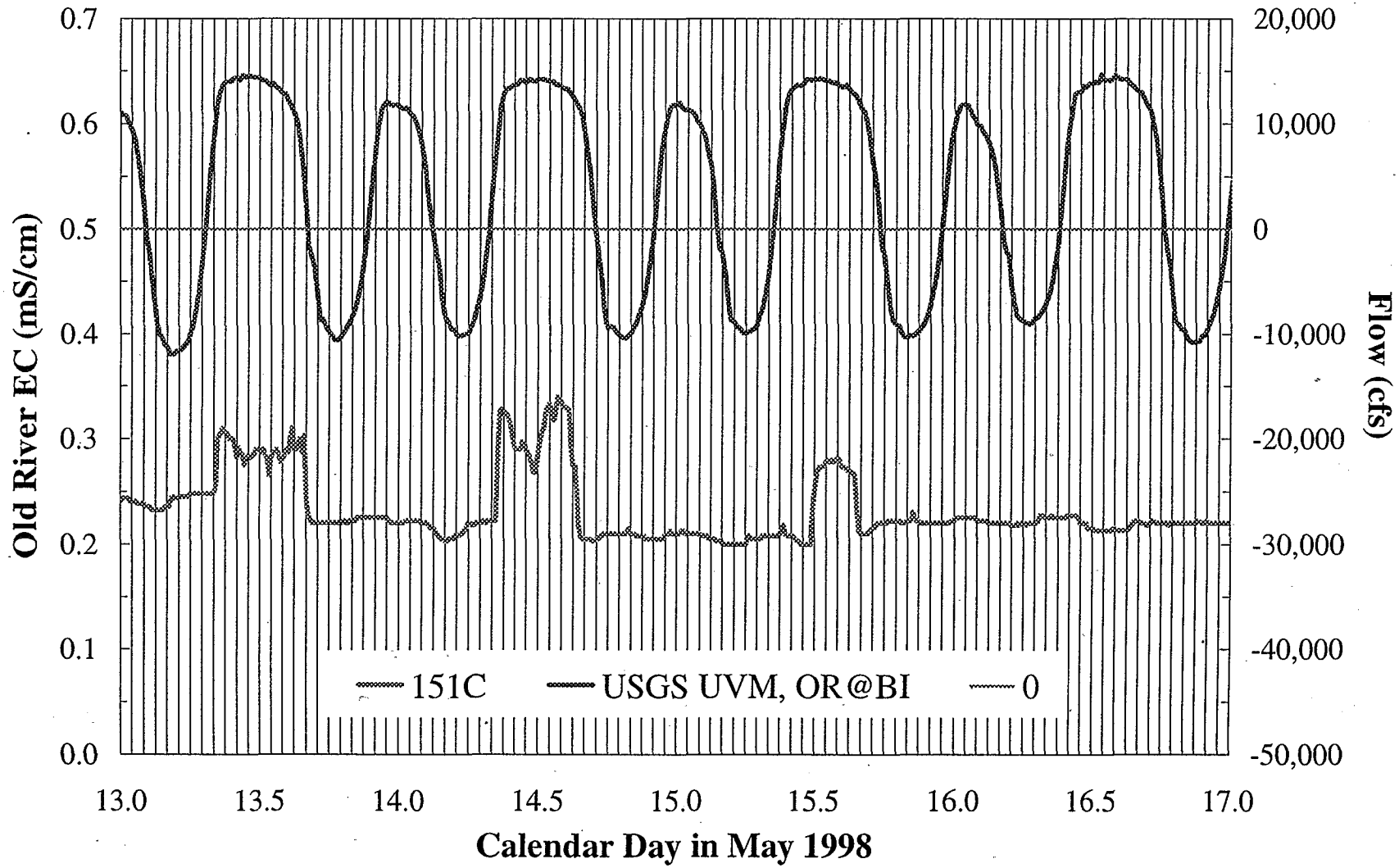
For low velocity discharges such as those from drainage pumps on Delta islands, the discharge jet is typically bent into the direction of channel flow and remains close to the shore. Most of the discharge might then be diverted downstream at an intake close by.

Such a situation is found close to the LV intake. A pumping facility of Reclamation District 800 (Byron Tract) discharges nearby to the south. Field measurements show that this discharge flows northward past the LV intake with limited dilution under certain hydrological conditions. This is consistent with the EC anomalies which occur when the flow in Old River is to the north.

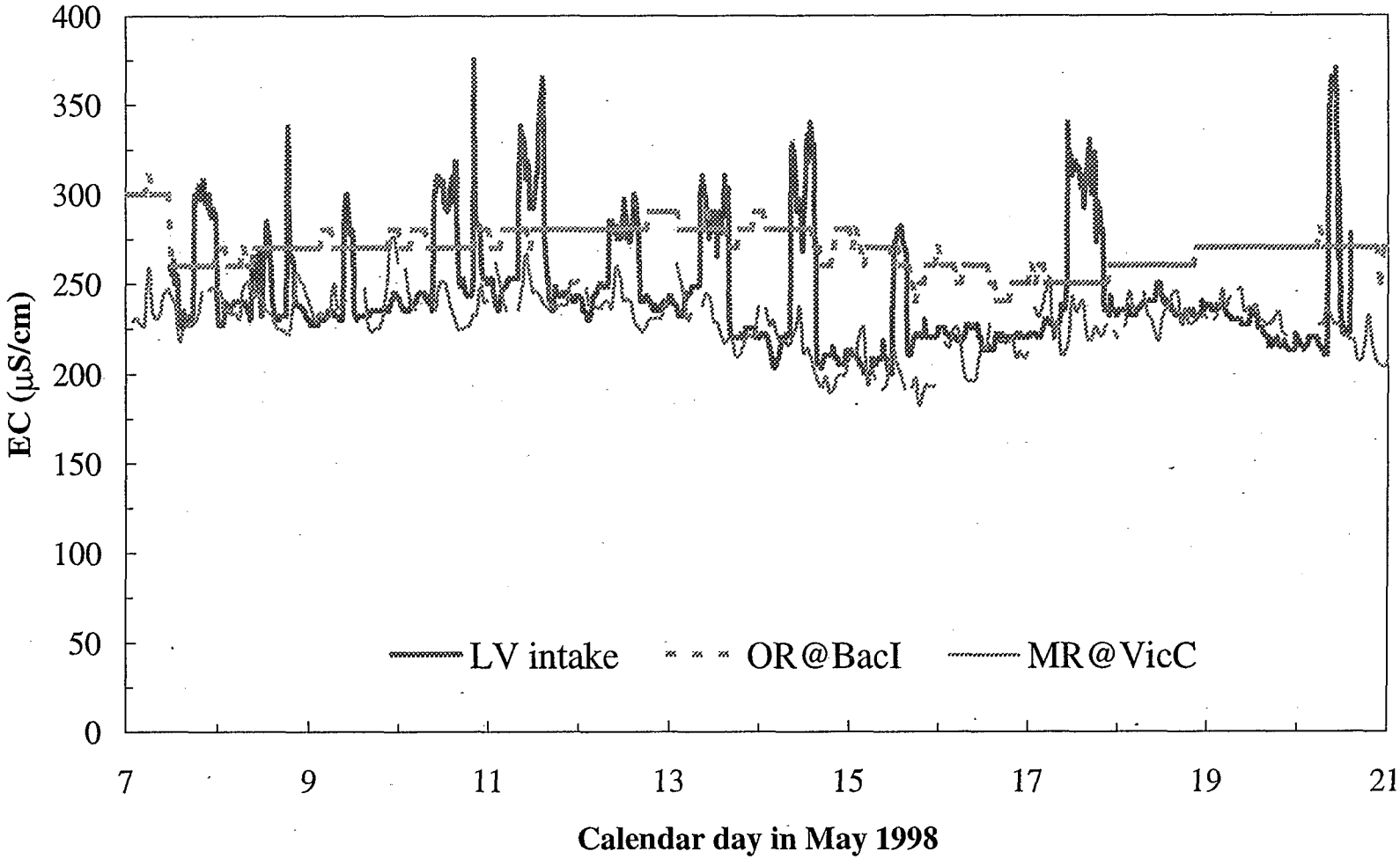
The EC anomalies have amplitudes in the range of 30 to 80 mg/L TDS.[3] The background salinity (in between the anomalies) was around 150 mg/L TDS (approximately 20 mg/L chloride). An EC measurement taken in May 1999 from the drainage pond at the pump facility in Byron Tract was over 2 mS/cm or 1,000 mg/L TDS. A dilution as high as 1:17 could lead to an increase in salinity at the LV intake from 150 to 200 mg/L TDS.

[1] Delta outflow had been high in the preceeding months and was above 60,000 cfs in May 1998.
[2] Between May 7 and 22, 1998, the San Joaquin River inflow varied between 16000 and 19000 cfs and EC varied between 0.14 and 0.20 mS/cm.
[3] Based on linear regressions developed at the Contra Costa Water District.

# Figure A-1. Salinity at Los Vaqueros Intake



# Figure A-2. EC Measurements at LV and Nearby Stations



**Attachment B**
**Water Quality Improvement Actions for Old River**

A number of possibilities could be considered as part of the CALFED Drinking Water Quality Program. The following is an incomplete list and none of the options discussed have been considered for adoption or sanctioned by CALFED or any other agencies. Recommendations resulting from the discussions in three Veale Tract/Byron Tract Workgroup (Work Group) meetings between September 8 and December 6 are summarized in each of the alternatives discussed below.

Outfall Improvement

Attachment A discusses the near-shore dispersion characteristics of the RD 800 discharge. The impact at the Los Vaqueros intake could be reduced substantially if this near-shore dispersion could be avoided. This can be accomplished in at least two ways:

- *Construct a diffuser* A properly designed diffuser would allow near complete mixing of the discharge over most of the channel cross-section by the time it passes CCWD's Los Vaqueros intake. The reach of Old River is subjected to periodic sedimentation which could clog up the diffuser ports. Dredging operations could add to the maintenance cost, possibly significantly. Boat anchoring would also have to be prohibited in the vicinity to avoid potential damage to the diffuser.

- *Extension of existing outfall across the river* An extension of the outfall to assure that the emerging plume disperses away from the Los Vaqueros intake could require less maintenance cost. The discharge pipe could be buried deep in the river bed to avoid damage from dredging operations.

It is believed that there could be a reduction of 90% using either approach. There is general agreement in the Work Group that a project to modify the outfall could be a strong candidate for CALFED's early implementation program by improving the water quality of a significant Delta drinking water supply.

Relocation

The discharge point of the Byron Tract drainage could be relocated. Some alternative discharge locations are:

- *Italian Slough* A new pump facility could be constructed at the south end of the existing drainage ditch to discharge into Italian Slough. Even though this could almost eliminate the drainage's impact on CCWD's Los Vaqueros intake, most of this redirected drainage could enter Clifton Court Forebay. The Work Group agrees that this option should not be pursued any further because of significant redirected impacts.

- *Indian Slough* A new pump facility could be constructed at the north end of the existing drainage ditch to discharge into Indian Slough. This alternative, however, has been rejected by the voters of the Discovery Bay community in 1972. The Work Group agrees that this option should not be pursued any further because of significant redirected impacts.

- *Old River* The existing RD 800 discharge likely becomes well-mixed over the channel cross-section beyond the river bends, both to the north and to the south of the reach of Old River where CCWD's Los Vaqueros intake is located. Relocation cost (conveyance and pumping facilities) could be substantial and the reduction in drainage impact to the Los Vaqueros intake is not likely to be higher than modification of the existing outfall structure. However, this alternative could be pursued in conjunction with wetlands creation (see section under "Treatment of drainage" below). The drainage could be passed through created wetlands to reduce pollutant loads before discharging into the Old River.

None of these relocation alternatives appear to be promising and are not recommended for further studies as early implementation action at this point. The Work Group recommends that the wetlands alternative be developed further and be considered for Stage 1 action if proved feasible.

Managing the timing of drainage discharge

The Byron Tract drainage reaching the Los Vaqueros intake through near-field dispersion could be reduced if it is released only when the flow in Old River is to the south (away from the intake). It is believed that this could achieve a reduction of Byron Tract drainage diverted at CCWD's Los Vaqueros intake by over 90%. Existing drainage conveyance facility might have sufficient capacity to withhold discharges for up to 12 hours under most conditions. However, the impacts of this alternative on water level in the drainage ditch and any additional power cost need to be more accurately quantified.

Treatment of drainage

*Wetland disposal* The Discovery Bay treated wastewater effluent could be discharged into newly created wetlands to remove some of the constituents of concern to drinking water agencies such as organic carbon and pathogens before the water is discharged into Delta channels. Availability of wetland (for example by conversion of marginally productive agricultural land) and integration with the ecosystem restoration program in CALFED should be explored.

*Reverse osmosis:* Alternatively, the drainage could be treated through advanced treatment such as reverse osmosis and the water could be reused for irrigation. The seasonal fluctuation of the drainage might make it difficult to size an effective and cost-efficient facility. At a current cost of $250 to $650 per acre-foot (AF), a drainage of 15,000 AF (Byron Tract is approximately 7,000 acre) would cost between $3,750,000 to $9,750,000 per year for complete treatment. The Work Group agrees that this option should not be eliminated from further considerations because of the high cost.

One major source of salt load in the Discovery Bay wastewater and the Byron Tract discharge is from water softeners widely used in the Discovery Bay community. One approach to reduce this source load is to reduce the hardness in its groundwater supply in addition to reducing manganese in the water treatment plant now under design. This would eliminate the need for home water softeners. The recently enacted Senate Bill 1006 (Chaptered on October 10, 1999 by Secretary of State, Chapter 969, Statutes of 1999) will allow the Discovery Bay Community Services District more control to manage this source load of salt in its wastewater discharge.

## Attachment C
## Water Degradation along Rock Slough and the Contra Costa Canal

The tidal flow and salt transport in Rock Slough and neighboring channels are discussed in this Attachment. The flow and transport in the area are such that a high salinity drainage discharged into Rock Slough leads to a disproportionate water quality degradation in CCWD's drinking water supply. Improvement on this existing condition is one of the highest priority in the Early Implementation Action in CALFED's Drinking Water Quality Program.

The Rock Slough intake to the canal is located in the west-central Delta in the vicinity of Knightsen in eastern Contra Costa County. The land surrounding Rock Slough is primarily agricultural. The water level in Rock Slough is subject to tidal variations, typically with a daily range of about 3.5 feet. Rock Slough salinity is high when there is seawater intrusion from San Pablo Bay during periods of low Delta outflow, or when drainage discharges from the Delta and the San Joaquin River are high. Seawater intrusion typically occurs during the summer months in dry years and fall months in most years. Both the volume and the salinity of Delta drainage are highest during leaching periods, usually after winter storms. In particular, local drainage has in the past increased the salinity at the Contra Costa Canal Pumping Plant No.1 (PP1) intake to 130 mg/L chloride when the salinity at the entrance to Rock Slough was only 20 or 30 mg/L chloride. The main impact of drainage is to increase dissolved solids, TOC, and possibly other pollutants such as pathogens at the intake.

Two dominant processes govern the flow in Rock Slough and the Contra Costa Canal. Tidal effects induce an oscillatory flow which carries a portion of the drainage in Rock Slough to Indian Slough and Sand Mound Slough. At the same time, CCWD's diversion at PP1 induces a mean flow in Rock Slough towards the Contra Costa Canal and carries the rest of the drainage in Rock Slough to CCWD's intake. At times of high CCWD diversion, a significant portion of the drainage in Rock Slough is likely drawn into the Canal. However, this drainage is substantially diluted by the time it reaches the Canal. A previous study confirmed the impact of the discharge from Veale Tract at PP1 located at the end of the unlined portion of the Canal.

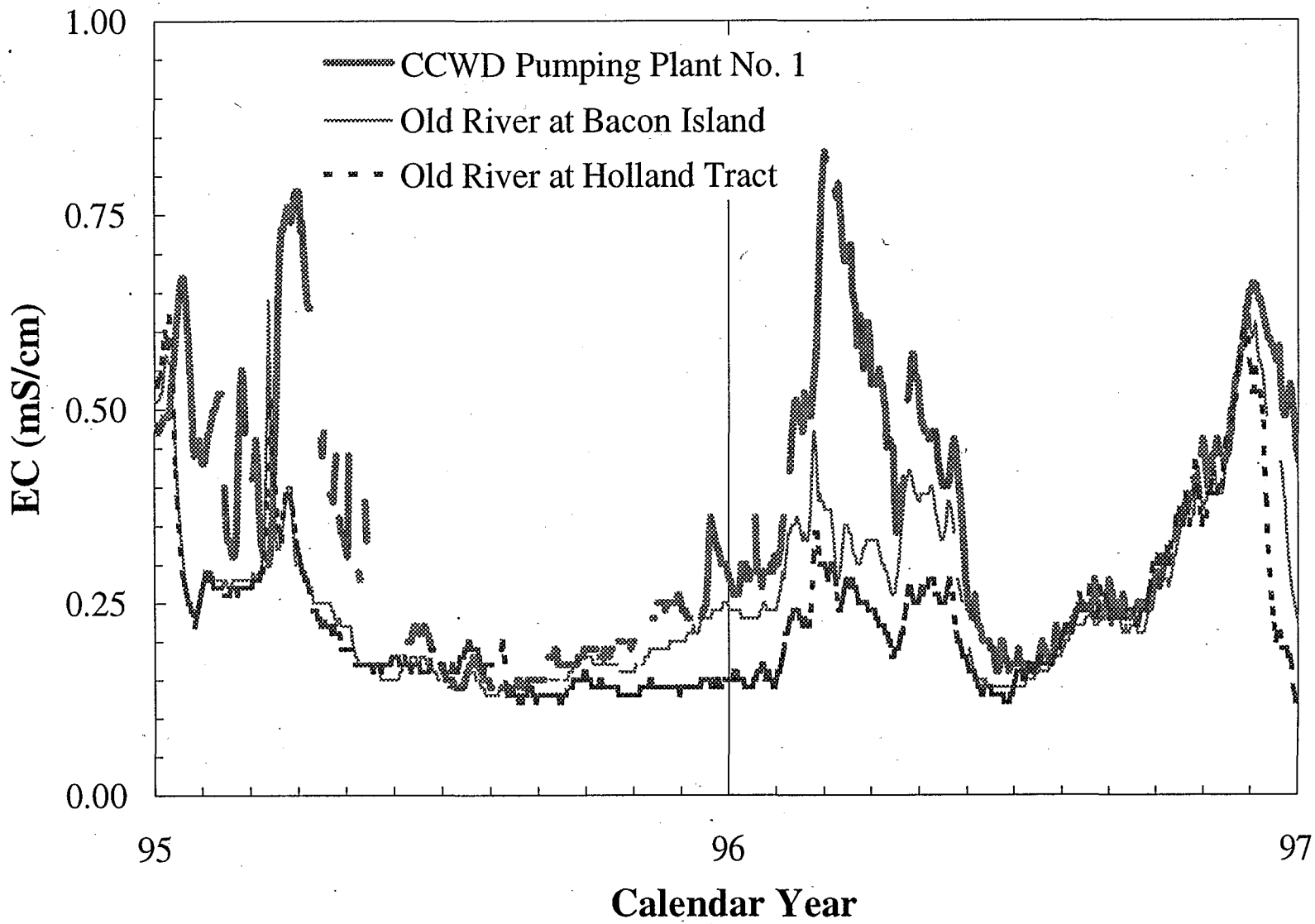
Two measurements of drainage water quality from Veale Tract are available. The total dissolved solids concentration was 2,160 mg/L in a December 1981 grab sample and 3,560 mg/L in a January 1982 sample. The January 1982 measurement also showed a chloride concentration of 1,014 mg/L and a sodium concentration of 770 mg/L. The volume of drainage is not known, but even a limited discharge rate (e.g. 5 million-gallons-per-day) of this high salinity drainage can lead to a substantial increase in chloride in CCWD's water supply. This drainage could contribute to a number of rapid and sharp increases in chloride at PP1 at the time when the Delta had relatively good water quality. For example, chloride concentration at Pumping Plant No. 1 increased from 57 mg/L on January 12, 1982 to 105 mg/L on January 15 when that in Old River at Holland Tract remained in the 30's. Simultaneous measurements on January 20, 1982 showed that the chloride concentration increased from 27 mg/L in Old River at Holland Tract to 91 mg/L in Rock Slough near the Sand Mound Slough junction, to 131 mg/L at Pumping Plant No.1.

More recent measurements are shown in Figure C-1 for the calendar years 1995 and 1996. Mean daily electrical conductivity (EC) at Pumping Plant No. 1 is compared to those at Old River at Bacon Island (near Santa Fe Railway Cut) and Holland Tract (near the junction of Sand Mound Slough and Piper Slough). The two latter stations give an estimate of the salinity in Rock Slough at Old River. In both years the EC at Pumping Plant No.1 was higher than that in Old River in the winter months. The periods of maximum salinity difference correlated with periods of high precipitation, when the farmlands in the Delta are usually leached and discharge high salinity drainage into Delta channels.

Water quality data on the Veale Tract drainage suggest that the discharge can increase chloride concentration at the intake by tens of mg/L. For example, a 5 MGD (averages 7.7 cfs) discharge from Veale Tract, at a chloride concentration of 750 mg/L, would increase chloride at PP1 from 30 mg/L to 54 mg/L chloride.[4] The actual drainage from Veale Tract could be much higher.

[4] For a rate of diversion at PP1 of 75 MGD (averages 116 cfs), typical in winter months, and assuming that half of the Veale Tract discharge reaches the intake.

# Figure C-1. Salinity in Rock Slough Vicinity



## Attachment D
## Potential Water Quality Improvement Actions for Rock Slough

The following is a partial list of mitigation possibilities that could be considered in the CALFED Water Quality Program. None of these options have been considered for adoption or sanctioned by CALFED or any other agencies. Recommendations resulting from the discussions in three Veale Tract/Byron Tract Workgroup (Work Group) meetings between September 8 and December 6 are summarized in each of the alternatives discussed below.

Relocation

The discharge point of the Veale Tract drainage in Rock Slough could be relocated. Some alternative discharge locations are:

- *Holland Tract* A siphon could be installed underneath Rock Slough to connect the existing Veale Tract pump station at Rock Slough to the closest drainage ditch in Holland Tract. The Holland Tract drainage is eventually discharged into Sand Mound Slough at Piper Slough at Franks Tract. While no quantitative analyses have been made, the hydrological conditions and transport characteristics in the region are such that the amount of Veale Tract drainage reaching PP1 could be reduced by over 90%. The drainage will also be directed away from other municipal intakes in the Delta.

- *No Name Cut or Werner Cut* There are two other drainage pump facilities in Veale Tract. One discharges into No Name Cut at the southern end of Veale Tract, and the other discharges into Werner Cut to the east. Numerical simulations for a limited range of hydrology show that using these two pumping facilities exclusively (and shutting down the Rock Slough discharge) could reduce the drainage reaching PP1 by 60%.

- *Sand Mound Slough* A pipe could be installed to convey drainage from the existing Veale Tract pump station at Rock Slough to immediately north of the one-way flow gates in Sand Mound Slough. This would likely reduce the drainage reaching PP1 by 90% or more. Preliminary cost estimates suggest that it would be a multi-million dollar project. Because of redirected impacts to likely future developments along Sand Mound Slough, the Work Group recommends that this alternative be eliminated from further consideration.

- *Marsh Creek* A pipe could be installed to convey drainage from the existing Veale Tract pump station at Rock Slough to a point below the existing discharge location of the Brentwood wastewater treatment plant. This would likely reduce the drainage reaching PP1 by 90% or more. The cost, however, could be prohibitive, and Marsh Creek has reached capacity under wet weather conditions. The Work Group recommends that this alternative be eliminated from further consideration.

Water quality impacts in the affected waterways and impacts on agriculture and other beneficial uses, in particular in Holland Tract and Hotchkiss Tract, would need to be carefully analyzed in all of these alternatives.

Managing the timing of drainage discharge

The percentage of Veale Tract drainage reaching PP1 could be reduced if it is released only when the flow in Rock Slough is away from PP1. The effectiveness of this alternative has yet to be quantified, as the typically high summer pumping at PP1 could cause the flow in Rock Slough to be towards PP1 during most of a tide cycle. Even though operation of the new Los Vaqueros intake at Old River could reduce the pumping at PP1 somewhat, this alternative could severely limit the operational flexibility of both CCWD and the Veale Tract farmers.

Treatment of drainage

*Wetland disposal* The Veale Tract drainage could be discharged into existing or created wetlands which would remove some constituents of concern to drinking water agencies such as organic carbon and pathogens before the water is discharged into Delta channels. Availability of wetland (for example conversion from marginally productive agricultural land) and integration with the ecosystem restoration program in CALFED should be explored. In particular, coordination with Knightsen flood management actions (see below) could result in a multiple benefits program that could be more cost-effective.

*Reverse osmosis* The drainage could be treated through advanced treatment such as reverse osmosis and the water could be reused for irrigation. The seasonal fluctuation of the drainage might make it difficult to size an effective and cost-efficient facility. At a current cost of $250 to $650 per acre-foot (AF), a drainage of 3,000 AF (Veale Tract is approximately 1,300 acre) would cost between $750,000 to $1,950,000 per year for complete treatment. Storage ponds for high intensity winter runoffs would be necessary. The Work Group agrees that this alternative should be eliminated from further consideration because of the high cost.

Controlling flows in Rock Slough

*Increase inflow from the Old River* A larger flow from Old River into Rock Slough could achieve a higher dilution of the Veale Tract drainage. This might be achieved by increasing the flow through the existing flow control structure in Sand Mound Slough, for example by increasing the size and number of culverts. The same head difference across the structure would then lead to a higher volume flow out of Rock Slough, thus drawing water in from the Old River. The effectiveness of this approach would need to be quantified. Current flow through the control structures is estimated to have a maximum of under 80 cfs and average under 30 cfs over a tide cycle. Substantial changes in the existing structure would be required to increase this flow significantly. The cost could be substantial if the existing headwork structure has to be modified.

*Separating Veale Tract drainage from inflow to the Contra Costa Canal* A complete barrier or an one-way flow barrier that allows flow from west to east only at the Delta Road Bridge would

prevent the Veale Tract drainage from reaching PP1. This structure could be operated in tandem with the existing flow control structure in Sand Mound Slough such that water is drawn into the Canal through either Sand Mound Slough or eastern end of Rock Slough based on the water quality in the two channels. The improvement this could achieve has yet to be quantified and could be limited since Sand Mound Slough is likely to have a higher salinity than Rock Slough under most conditions because of higher seawater intrusion in Sand Mound Slough. At times of high runoffs due to wet weather, drainage from Holland Tract and Hotchkiss Tract could lead to a high salinity in Sand Mound Slough at the same time drainage from Veale Tract leads to a high salinity in Rock Slough. Other issues to be addressed include impacts on navigation, recreation, fishery, and other beneficial uses.

Both of these alternatives would lead to substantial changes in hydrology in the region and would preclude them as early implementation actions. They are low priority alternatives due to their low effectiveness in meeting the project objective of improving drinking water quality at Delta intakes.

Coordination with flood management in Knightsen

The potential linkage of this project to flood management in Knightsen was discussed during the Work Group meetings. Knightsen is to the west of Veale Tract. Wet weather runoff from Knightsen flows towards the Contra Costa Canal and Rock Slough and in most years would flood an area south of the levee road along Rock Slough and west of Veale Tract. A number of flood management plans have been developed in the past but did not proceed because of a lack of funding.

The potential water quality impacts of wet weather runoffs from the Knightsen area have not been established, and are not obvious in view of the hydrological conditions in the area. However, a number of flood management alternatives developed in the past share similar features with the relocation options (to No Name Slough and Werner Cut, for example) and the wetland treatment alternative. The potential for a joint project exists and a flood management component is included in this proposal. Funding from outside of the CALFED Drinking Water Quality program would be sought if flood management actions are included as part of this project.

# EXECUTIVE SUMMARY
# BAY AREA REGIONAL BLENDING ASSESSMENT

## Project Purpose

The purpose of this study is to perform a preliminary investigation of the potential for blending of Sierra quality water or additional storage of higher quality Delta water to improve source water quality for Bay Area urban water suppliers.

## Project Description

The initial phase will focus on two technical tasks: 1) quantitatively assess individual agency needs for higher quality source water; and 2) assess the ability of existing facilities to convey the needed quantities assuming the water is available. An additional phase related to identification of specific sources of higher quality supply would be undertaken if warranted by the results of the initial phase.

The water quality objective/target would be to provide source water quality for Contra Costa Water District (CCWD), Santa Clara Valley Water District (SCVWD), and South Bay Aqueduct contractors in the required concentration levels of or less than 50 µg/L bromide, < 3.0 mg/l total organic carbon (TOC), and 150 mg/l total dissolved solids (TDS), consistent with CALFED's long-term water quality targets. This is consistent with one of the recommendations provided in the CALFED Water Quality Control Improvement Strategies which was to evaluate the potential for alternative sources, including blended sources, to provide high quality water supplies to Bay Area water users.

## Implementing Agencies

The project will be lead by the CALFED Drinking Water Quality Program.

## Task Description

A detailed scope of work was developed by a CALFED consultant.

## Schedule and Costs

We are requesting $100,000 in CALFED funds to cover the cost of a consultant who will work under the direction of CALFED Drinking Water Quality Program staff. In-kind services would be provided by the following Bay Area urban water suppliers: Alameda County Water District; Contra Costa Water District; East Bay Municipal Utility District; Santa Clara Valley Water District; San Francisco Public Utilities Commission; Bay Areas Water Users Association; Zone 7 Water Agency.

## Project Management

The Project Manager will be a CALFED consultant who will work under the supervision of the Drinking Water Quality Program Manager. Policy and technical input would be provided through stakeholder committees.

## Scope of Work for Regional Blending Preliminary Assessment
## December 9, 1999

CALFED is committed to achieving continuous improvement in the quality of waters of the Bay-Delta estuary with the goal of minimizing ecological, drinking water, and other water quality problems, and to maintaining that quality once achieved. The CALFED drinking water quality objective is to protect source water quality that allows municipal water suppliers to deliver safe, reliable, and affordable drinking water that meets and, where feasible, exceeds applicable drinking water standards. The strategy for protecting drinking water quality is to minimize the impacts of bromide, total organic carbon (TOC) , salinity, pathogens, nutrients, and turbidity through a combination of measures that include source reduction, alternative sources of water, treatment, and storage and conveyance improvements. CALFED will develop and perform these actions and related studies under the scrutiny of the Delta Drinking Water Council, a public advisory group to be comprised of urban water agency, environmental, business, Delta and public health agency representatives.

The Bay Area water users rely upon several water supplies, including water from the Sierra Nevada streams, Delta water provided by the State Water Project (SWP) and Central Valley Project (CVP), local runoff, and local groundwater. One of the methods to provide high quality water for drinking water purposes in the Bay Area would be to consider blending water from two or more of these sources to provide a blended water quality that may be higher than the seasonal water quality of a single water source.

The following is a scope of work which outlines the analysis needed to assess the potential for regional blending concepts to improve source water quality for Bay Area drinking water suppliers. According to CALFED's Phase II Report (June 25, 1999) regional blending actions, complemented by other water quality improvement elements such as treatment and source control, could collectively contribute to meeting the source water quality goals specified under the CALFED Drinking Water Quality Improvement Strategy. However, the participating agencies do not expect the actions being analyzed within this scope to be used to mitigate for actions or impacts of a broader implemented CALFED Program.

### Underlying Principles and Assumptions for this Study

1. No negative impacts to any agency, except if mitigation of negative impacts is acceptable to the agency being impacted. This principle then applies to the following areas:
   a) Existing water rights or entitlements
   b) Existing water quality for any agency
   c) Existing supply reliability for any agency. Example – East Bay Municipal Utility District (EBMUD) aqueducts are generally fully used by EBMUD in the April to September timeframe.

2. Participation is voluntary and each agency must agree with any recommendation involving its facilities.
3. No agency will be required to bear facility costs that benefit another agency.

4. Facility operations to benefit another agency are lowest priority and interruptible by the agency owning and/or operating the facilities.

5. This work is preliminary (pre-feasibility level). Thorough environmental-regulatory review, public outreach, development of detailed operating arrangements, and potentially more detailed analyses of water quality interactions would be necessary to advance the results of this preliminary study.

6. Water supply reliability goals should not be "lost" in this study.

## Purpose

The purpose of this study is to perform a preliminary investigation of the potential for blending of Sierra quality water or additional storage of higher quality Delta water to improve source water quality for Bay Area urban water suppliers. The initial phase will focus on two technical tasks: 1) quantitatively assess individual agency needs for higher quality source water; and 2) assess the ability of existing facilities to convey the needed quantities assuming the water is available. An additional phase related to identification of specific sources of higher quality supply would be undertaken if warranted by the results of the initial phase.

The water quality objective/target would be to provide source water quality for Contra Costa Water District (CCWD), Santa Clara Valley Water District (SCVWD), and South Bay Aqueduct contractors in the required concentration levels of or less than 50 μg/L bromide, < 3.0 mg/l total organic carbon (TOC), and 150 mg/l total dissolved solids (TDS), consistent with CALFED's long-term water quality targets. This is consistent with one of the recommendations provided in the CALFED Water Quality Control Improvement Strategies which was to evaluate the potential for alternative sources, including blended sources, to provide high quality water supplies to Bay Area water users.

## Scope of Work

The tasks detailed below are designed to quantify the amount of Sierra (or high quality Delta) supplies needed, the water quality of various sources, and the potential for current conveyance facilities to deliver the needed quantities of high-quality water. For the initial phase of work the availability of high-quality supplies will be assumed. If promising options result from the initial work, water availability will be refined in a subsequent phase. The proposed dates for completion of the tasks are based upon the assumption of initiating the project by mid-January 2000.

## Task A: Water Quality Needs Assessment

**Task A1:** Collect and tabulate recent (post-1990) historical concentration data, by water-year type, for TDS, bromide, chloride, and TOC in the south Delta at Rock Slough, Old River near Highway 4, Clifton Court Forebay, Tracy Pumping Plant, and San Luis Reservoir and at least two Sierra sources (Mokelumne River at Pardee Reservoir and Tuolumne River above New Don Pedro Reservoir). These data also will be collected for raw water and finished water streams at the water treatment plants of the Bay Area water agencies. Meetings will be held with all of the participating agencies to obtain the information.

***Timeline for Data Collection: late-January 2000***

**Task A2:** This information will be correlated with water year types and precipitation in the affected watersheds to identify trends that may occur under different hydrological conditions. Average concentrations, by water-year type, of TDS, bromide, chloride, and TOC will be calculated for each source and historical raw water streams. For this study, water quality at buildout, 2020 or beyond, will be assumed to be similar to that of the existing Delta and upper watersheds. No degradation in these sources will be assumed. If water quality does degrade in either source then the effectiveness of the exchanges will decrease.

A draft Technical Memorandum will be prepared for each water source and water agency. The draft Technical Memoranda will be circulated to obtain review comments. Following receipt of the comments, final Technical Memoranda will be prepared. A Summary Report will be prepared incorporating the information from all of the final documents.

***Timeline for Draft Technical Memoranda: mid-February 2000***

## Task B: Determine Imported high-Quality Needs

**Task B1:** Tabulate the approximate existing, end-of-Stage 1 (2007), and buildout (2020 or beyond) SWP, CVP, and Hetch Hetchy imported water demands of Alameda County Water District (ACWD), CCWD, SCVWD, and Zone 7 of Alameda County Flood Control and Water Conservation District (Zone 7). Tabulate the approximate existing, end-of-Stage 1 (2007), and buildout (2020 or beyond) imported water demands in the service areas supplied by EBMUD and San Francisco Public Utility Commission (SFPUC). Demand estimation at buildout should be consistent with future conservation and reclamation projects and with individual agency Integrated Resource Plans (IRPs) or Master Plans. The demands will be provided based upon water year types and seasonal conditions. Information concerning water supply facilities also will be collected and tabulated under this task.

A draft Technical Memorandum will be prepared for each water agency summarizing the collected information.

***Timeline for Draft Technical Memoranda: mid-February 2000***

**Task B2:** Refine ACWD, CCWD, SCVWD, and Zone 7 imported high-quality water demand based on intra-district blending opportunities: imported Delta water in certain cases is mixed with local sources before entering water treatment plants. Assess the frequency and extent of intra-District blending by considering the existing and planned alternative sources that are available to each agency, and existing and future infrastructure limitations and needs. Compute the required amount of imported Delta and Sierra water based on the quality of the internal district sources.

This task would consider the quality and quantity of other sources available to the agencies (such as ground water and other imported water supplies) and the general routing of supplies within agency service areas (to the extent that these factors would affect blending). Additionally, this task would involve gathering data and problem identification, including compilation and documentation of each agencies' Master Plans or Integrated Water Supply Plans and identification of physical and institutional limitations. The needs will be correlated to water year types and seasonal conditions.

Meetings will be held with each agency to develop the framework for the assessment of future intra-district blending opportunities.

A draft Technical Memorandum will be prepared for each water agency, including the data compiled under Task B1. The draft Technical Memoranda will be circulated to obtain review comments. Following receipt of the comments, final Technical Memoranda will be prepared. A Summary Report will be prepared incorporating the information from all of the final documents.

***Timeline for Draft Technical Memoranda: early March 2000***

## Task C: Assess the Capacity of Existing Facilities to Convey the Needed Quantities

Assuming the availability of high quality supplies, assess the capacity of facilities to transport needed quantities of water. It would be assumed, generally, that the transport of water through one agency's facilities for the benefit of another agency will be assigned a lower priority if conflicting objectives arise. Existing capacity and locations of delivery points and operating conditions will determine the quantity of water that can be delivered to a specific location. These parameters will be provided by each agency. The selection of delivery points will be consistent with project concepts that are mutually agreeable to the Bay Area agencies whose facilities are involved.

Available conveyance capacity will be evaluated at four stages: existing facilities with existing demand, projected facilities and demand at the end of CALFED Stage 1 or 2007, projected facilities and demand in 2020, and projected facilities and demand after full implementation of individual agency IRPs.

Identify local and regional projects including storage, treatment, physical inter-connections and conveyance facilities which would affect the need for imported high-quality water by improving

blending within individual agency service areas. These local and regional projects would be consistent with local IRPs. Quantify the extent to which water quality needs are met at each of the four stages subject to the capacity constraints.

Information collected from the participating agencies under Task B will be compiled in a manner to facilitate a meeting to identify potential local and regional projects. A Pre-Meeting package will be prepared and circulated at least 7 calendar days prior to the meeting. Alternatives identified in the meeting will be included in a technical memorandum with other potential methods identified during this process. Each alternative will be evaluated as part of this screening process to determine overall technical feasibility and identify facilities to allow implementation, potential environmental constraints, and institutional requirements.

A draft Technical Memorandum will be prepared and circulated to obtain review comments. Following receipt of the comments, a final Technical Memorandum will be prepared.

***Timeline: March - April 2000***

## Task D: Refinement of Water Availability

**Task D1:** If results from the tasks above suggest reasonable potential for water quality improvements, develop "availability" estimates of Sierra and Delta supplies based on CALFED's proposed operational assumptions. Using the regional exchanges project concepts and the refined availability of Sierra and Delta supplies, determine water quality improvements for ACWD, CCWD, SCVWD, and Zone 7. The project concepts include existing and potential storage and conveyance facilities.

A draft Technical Memorandum will be prepared and circulated to obtain review comments. Following receipt of the comments, a final Technical Memorandum will be prepared.

***Timeline: April 2000***

**Task D2:** Based upon the results of Task D1, refine the regional exchange project concepts based on contractual, institutional, permitting, environmental and legal issues, and identify all affected parties. Develop recommendations to implement the project concepts.

A Final Report will be prepared summarizing the information collected and the results of the of the analysis in Tasks A through D. A draft of the Final Report will be prepared and circulated to obtain review comments. Following receipt of the comments, a Final Report will be prepared.

***Timeline: May 2000***